Asian Pac. J. Health Sci., **2017; 4(1):100-106** **e-ISSN: 2349-0659, p-ISSN: 2350-0964**

Document heading **doi: 10.21276/apjhs.2017.4.1.18** **Research Article**

Comparative Analysis of outcome in patients of Lumbar Canal Stenosis undergoing decompression with and without Instrumentation

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ABSTRACT

Introduction: There is considerable debate among spine surgeons regarding whether instrumented fusion should be used to augment de-compressive surgery in patients with symptomatic lumbar spinal stenosis. The aim of our study was to compare the clinical and functional outcome of patients undergoing decompression for lumbar canal stenosis with and without instrumentation and to analyze the effect on outcome variables using Japanese Orthopedics Association (JOA) score. **Materials and methods:** Seventeen patients of degenerative lumbar canal stenosis managed surgically were included in this study. Decompression with instrumentation (n=9) and decompression without instrumentation (n=8) were performed. JOA scoring system for low back pain syndrome was used to assess the patients. The recovery rate was calculated as described by Hirabayashi et al (1981), Surgical outcome was assessed based on the recovery rate and was classified using a four-grade scale: Excellent, improvement of > 90%; Good, 75—89% improvement; Fair, 50- 74% improvement; and Poor, below 49% improvement. The patients were evaluated at 3 months, 6 months and at last follow-up. **Results:**At 3 month follow up 62.50% patients undergoing decompression with instrumentation showed good outcome and 12.50% patients undergoing decompression without instrumentation showed good outcome. At 6 month follow up 14.29% patients undergoing decompression with instrumentation showed excellent outcome and 12.50% patients undergoing decompression without instrumentation showed excellent outcome. At >6month follow up 42.86% patients undergoing decompression with instrumentation showed excellent outcome and 28.57% patients undergoing decompression without instrumentation showed excellent outcome. **Conclusion:** Overall recovery rate is higher in patients undergoing decompression with instrumentation than patients undergoing decompression alone. There is gross improvement in JOA score at final follow-up of pre-operative patients but there is no statistically significant difference between the post-operative JOA score at final follow-up of Group-A Vs Group-B.

Keywords: L.B.P., LCS., Decompression, Instrumentation.

Introduction

There is considerable debate among spine surgeons regarding whether instrumented pedicle screw fixation and fusion should also be undertaken when a de-compressive laminectomy is performed to relieve neural compression. Evaluation of small prospective studies indicates that the addition of fusion may improve outcomes[1-3].

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This study compares the outcome in patients of lumbar canal stenosis undergoing decompression with and without instrumentation and analyzes the effect on different outcome variables using the JOA score.

Materials and methods

This prospective study was conducted at our hospital between December 2011 to October 2014 after obtaining clearance from the institutional ethical committee. During this period, patient presenting with low backache and intermittent claudication of non vascular origin with suspected lumbar disc prolapse, Listhesis and lumbar canal stenosis was admitted in our institution. Patients who had posture-related radicular

pain with claudication distance less than 100 meter and who could not carry out their routine daily activities were assessed with magnetic resonance imaging (MRI). Surgery was performed if the central canal diameter on MRI was found to be less than or equal to 10 mm. Patients with primary bony canal stenosis, traumatic lumbar canal stenosis, stenosis due to tumors and infection, and patients not medically fit for surgery due to co-morbidities were excluded from the study, Patients were managed operatively by decompression with instrumentation or decompression without instrumentation. All procedures were performed by senior orthopedic surgeon. According to this protocol, laminectomy with decompression was done in 2 cases, laminectomy and disectomy was done in 5 patients, laminectomy, disectomy with instrumented stabilization was done in 9 cases, and laminectomy, disectomy with posterior lumbar interbody fusion was performed in 1 patients. Average follow-up period was 10 months (range: 1- 18 months). Patients were followed at 3 months, 6 months and >6 months of periods. Pre treatment and post treatment assessment of the patients was done according to JOA evaluation system for low back pain syndrome. The JOA score was determined by direct questioning to assess subjective symptoms, clinical signs, and restriction of activities of daily living. The recovery rate of' the patients following treatment was calculated by using the description of Hirabayashi et al (1981)': Recovery rate (%) = (Postoperative score - Preoperative score)/ (29 - Preoperative score) x100. Recovery rate was classified using a four-grade scale: Excellent, >90%; good, 75-89%; fair, 50-74%; and poor, below 49%.

Statistical Analysis

Preoperative and postoperative JOA scores at immediate, 3 month, 6 month, and >6 month at six monthly interval follow-up were compared using unpaired t-test.

Results

The average age was 46.59 years (range 28-73 years). There were 7 males and 10 females. Complete data of all the 17 patients along with their JOA scores are presented in table-1 below

Table 1: Complete data of all the 17 patients along with their JOA scores

	Pt.Name/ Age/Sex	Diagnosis	Procedure	Pre-op JOA Score	JOA Score at 1 month (%)	JOA Score at 3 months (%)	JOA Score at 6 months (%)	JOA Score at >6 months (%)	Follow-up (months)	Outcome
1	MG/56/F	LCS L4-L5	Lam and ds and inst.	8	23	26	26	26	18	GOOD
2	NA/28/F	LCS L4-L5,L5-S1,L3-L4	Lam and disand inst.	12	18	27	27	27	9	GOOD
3	RT/30/F	LCS L5-S1	Lam and dis and inst.	7	13	25	27		8	EXCELLENT
4	SR/28/F	LCS L4-L5,L5-S1	Lam and dis and inst.	11	20				1	FAIR
5	S/28/F	LCS D12- L2	Lam and dis and inst.	8	13	21	26	28	8	EXCELLENT
6 .	5/45/F	LCS L3-L4, L4-L5, L5-Si	Lam and dis and inst.	12	17	22	27	27	11	GOOD
7	HB/73/M	LCS L1-L2, L2-L3	Lam and dis and inst.	13	21	25	27	28	12	EXCELLENT
8	RC/55/M	LCS L5-S1	Lam and dis and inst.	8	13	22	24	24	12	GOOD

9	SR/50/M	LCS L4-L5, L5-S1	Lam and dis and inst.	9	19	26			3	GOOD
10	AR/65/F	LCS L4-L5	Lam and dis and BG	7	15	22	25	26	13	GOOD
11	RS/55/F	SPO L5-S1	Lam and dis	2	11	21	25	25	11	GOOD
12	RD/54/F	LCS L4-L5, L3-L4	Lam	9	17	21	26	26	14	GOOD
13	S/35/F	LCS L4-L5, L5-S1	Lam	11	18	25	28	28	13	EXCELLENT
14	G/60/M	LCS L4-L5, L5-S1	Lam and dis	12	21	24	25	26	12	GOOD
15	MS/30/M	LCS L4-L5, L5-Si	Lam and dis	12	26				1	GOOD
16	MP/45/M	LCS L5-S1	Lam and dis	11	18	24	27	28	11	EXCELLENT
17	**RS/55/M**	**LCS L5-S1**	**Lam and dis**	**11**	**18**	**23**	**25**	**25**	**13**	**GOOD**

Preoperatively, 94, 12% (n16) patients complained of' severe low back ache, out of which 64.7 1% (n=11) complained of' continuous severe and 29.4 1% (n5) complained of occasional severe back ache. Only 5.88% (n=1) patients complained of occasional mild backache. 94.12% (n 16) patients presented with severe leg pain, 5882% (n=10) of which presented with continuous severe and 35.29% (n=6) presented with occasional severe leg pain confined to involved root. Only 5.88% (n=1) patients presented with mild occasional leg pain. 52.94% (n=9) patients were unable to walk farther than 100 meters fit (1 47.05% (n8) patients were able to walk more than 500 meters but it resulted in symptoms. No patients presented with bladder bowel involvement. 94.12% (ii= 16) patients had sensory deficit, 52.94% (n=9) patients presented with severe and 41.18% (n=7) patients presented with slight sensory disturbances. All patients had motor weakness, 52.94% (n=9) patients had motor power of grade 3 or less and 47.06% (n=8) patients had motor power grade 4. Straight leg raising test was abnormal in all patients. In 7059% (n=12) patients it was positive at less than 30° while in another 2941% (n=5) it was positive between 30° — 70.° The most common level of involvement was L - L5 (82.35% patients, ii = 14) followed by Li-Li (65.71% patients, n 11). 82.35% (n=14) patients showed involvement at more than one level 77.77% (n=7) of patients undergoing decompression with instrumentation get complete relief from low back pain 75% (n6) of patients undergoing decompression without instrumentation get complete relief from low back pain. All patients undergoing decompression with instrumentation get complete relief from leg-pain / tingling and gait become normal at final follow-up while 87.5% (n=7) of patients undergoing decompression without instrumentation get complete relief from leg pain/tingling. Gait becomes normal in all patients undergoing decompression with or without instrumentation at final followup. 88.88% (n==8) of' patient who underwent decompression with instrumentation had sensory deficit, out of which 87.5% (n=7) have complete recovery. 44.44% (n=4) of patients who underwent decompression with instrumentation get complete recovery from motor deficit. All patient who underwent decompression without instrumentation had sensory deficit, out of' which 75% (n=6) have complete recovery. All patients who underwent decompression without instrumentation had motor deficit, out of which 75% (n=6) have complete recovery. Most of patients who underwent decompression with instrumentation have difficulty in lifting heavy weight (55.55%,n=5) and running (88.88%,n8) Most of Patients who underwent decompression without instrumentation have difficulty in lifting heavy weight (75%,n6) and running (87.5%,n=7).

Those patients who underwent decompression with instrumentation, at 3 month follow-up, 62.50% (n5) patients showed good outcome, 37,50% (i3) showed fair outcome, [Table -j. At 6 month follow-up, 14.29% patients (ii 1) showed excellent outcome and 85.7 1% patients (n 6) showed good outcome. At >6rnonth follow-up, 42.86% patients (11 = 3) showed excellent outcome and 57.14% patients (n 4) showed good outcome. No patient had poor outcome.

Table 2: Variable of JOA Score for Patients Undergoing Decompression with Instrumentation

Subjective symptoms	Evaluation (score)	Patients before treatment		Patients after treatment	
		No.	%	No.	%
Low back ache	None (3)	0	0	7	77.77
	Occasional mild (2)	1	11.11	2	22.22
	Occasional, severe (1)	4	44.44	0	0
	Continuous, severe (0)	4	44.44	0	0
Leg pain/Tingling	None (3)	0	0	9	100
	Occasional, mild (2)	1	11.11	0	0
	Occasional, severe (1)	3	33.33	0	0
	Continuous, severe (0)	5	55.55	0	0
Gait	Normal (3)	0	0	9	100
	Able to walk further than 500 meters although It results in symptoms (2)	3	33.33	0	0
	Unable to walk > 100 meters (0)	6	66.66	0	0
S.L.R test	Normal (2)	0	0	8	88.88
	30—70(1)	3	33.33	1	11.11
	<30 (0)	6	66.66	0	0
Sensory Deficit	None (2)	1	11.11	8	88.88
	Slight (1)	4	44.44	1	11.11
	Severe (0)	4	44.44	0	0
Motor Deficit	Normal (2)	0	0	4	44.44
	>Grade3(1)	2	22.22	5	55.55
	≤Grade 3 (0)	7	77.77	0	0
Turnover while lying	Easy (2)	3	33.33	9	100
	Difficult(1)	6	66.66	0	0
	Impossible (0)	0	0	0	0
Standing up	Easy (2)	0	0	9	100
	Difficult (1)	9	100	0	0
	Impossible (0)	0	0	0	0
Washing face	Easy (2)	8	88.88	9	100
	Difficult(1)	1	11.11	0	0
	Impossible (0)	1	11.11	0	0
Leaning forward	Easy (2)	2	22.22	7	77.77
	Difficult (1)	6	66.66	2	22.22
	Impossible (0)	0	0	0	0
Sitting about 1 hr	Easy (2)	2	22.22	8	88.88
	Difficult (1)	6	66.66	1	11.11
	Impossible (0)	1	11.11	0	0
Lifting heavyweight	Easy (2)	0	0	3	33.33
	Difficult (1)	2	22.22	5	55.55
	Impossible (0)	7	77.77	1	11.11
Running	Easy (2)	0	0	0	0
	Difficult (1) 0	0	0	8	88.88
	Impossible (0) 9	**9**	**100**	**1**	**11.11**

Those patients who underwent decompression without instrumentation, at 3 month follow-up, 12,50% (n 1) patients showed good outcome, 87.50% (ii = 7) showed fair outcome, (Table -1. At 6 month follow-up, 12.50% patients (n-1) showed excellent outcome and 87.50% patients (n = 7) showed good outcome. At > 6 rnonth follow-up, 28.57%

patients (ii 2) showed excellent outcome arid 71.43 % patients (n= 5) showed good outcome. No patient had poor outcome.

Table 3: Variable of JOA Score for Patients Undergoing Decompression without Instrumentation

SUBJECTIVE SYMPTOMS	EVALUATION (SCORE)	Patients before treatment		Patients after treatment	
		No.	%	No.	%
LOW back ache	None (3)	0	0	6	75
	Occasional mild (2)	0	0	2	25
	Occasional, severe (1)	1	12.5	0	0
	Continuous, severe (0)	7	87.5	0	0
Leg pain/tingling	None (3)	0	0	7	87.5
	Occasional, mild (2)	0	0	1	12.5
	Occasional, severe (1)	3	37.5	0	0
	Continuous, severe (0)	5	62.5	0	0
Gait	Normal (3)	0	0	8	100
	Able to walk further than 500 meters although It results in symptoms (2)	5	62.5	0	0
	Unable to walk > 100 meters (0)	3	37.5	0	0
S.LR test	Normal (2)	0	0	8	100
	30—70(1)	2	25	0	0
	<30 (0)	6	75	0	0
Sensory Deficit	None (2)	0	0	6	75
	Slight (1)	3	37.5	2	12.5
	Severe (0)	5	62.5	0	0
Motor Deficit	Normal (2)	0	0	6	75
	>Grade3(1)	6	75	2	25
	≤Grade 3 (0)	1	14	0	0
Turnover while lying	Easy (2)	5	62.5	8	100
	Difficult(1)	3	37.5	0	0
	Impossible (0)	0	0	0	0
Standing up	Easy (2)	7	87.5	0	0
	Difficult (1)	3	37.5	0	0
	Impossible (0)	1	12.5	0	0
Washing face	Easy (2)	5	62.5	8	100
	Difficult(1)	3	37.5	0	0
	Impossible (0)	0	0	0	0
Leaning forward	Easy (2)	2	25	0	0
	Difficult (1)	4	50	8	100
	Impossible (0)	2	25	0	0
Sitting about 1 hr	Easy (2)	0	0	5	62.5
	Difficult (1)	5	62.5	3	37.5
	Impossible (0)	3	37.5	0	0
Lifting heavyweight	Easy (2)	0	0	2	25
	Difficult (1)	7	87.5	0	0
	Impossible (0)	7	87.5	0	0
Running	Easy (2)	0	0	1	12.5
	Difficult (1) 0	0	0	7	87.5
	Impossible (0) 9	**8**	**100**	**0**	**0**

There is gross improvement in JOA Score for low back pain of pre-operative patients. At 3 month follow-up, J)-value (< 0.05) is significant for group-A Vs. group-B but there is no significant difference between the post-operative JOA score for low back pain of Group A Vs. Group B at final follow-up. In our study there is gross

improvement in JOA score at final follow-up of' pre-operative patients but there is no statistically significant difference between the postoperative JOA score at final follow-up of' Group A Vs. Group B.

Table 4: showing comparison between group a and group b for low back pain using joa score

Low back pain														
Group A **(Decompression with instrumentation)**							**Group B** (Decompression without instrumentation)							**Group A Vs B**
Pre-op			**At 3 month**			**P value**	**Pre-op**			**At 3 month**			**P value**	At 3 months
N	Mean	SD	N	Mean	SD	Paired t- test	N	Mean	SD	N	Mean	SD	Paired t test	**P value**
9	0.778	0.667	8	2.500	0.535	0.000830	8	0.250	0.463	8	2	0.000	0.000013	**0.033146**
Pre-op			At 3 month			Pvalue	Pre-op			At 3 month			P value	**At 3 months**
N	Mean	SD	N	Mean	SD	Paired t-test	N	Mean	SD	N	Mean	SD	Paired t test	**P value**
9	0.778	0.667	7	2.857	0.378	0.001845	8	0.250	0.463	7	2.43	0.535	0.000203	**0.111685**
Pre-op			At 3 month			P value	Pre-op			At 3 month			P value	**At 3 months**
N	Mean	SD	N	Mean	SD	Paired t test	N	Mean	SD	N	Mean	SD	Paired t test	**P value**
9	**0.778**	**0.667**	**6**	**3.000**	**0.000**	**0.000887**	**8**	**0.250**	**0.463**	**7**	**2.71**	**0.488**	**0.000014**	**0.172308**

Table 5: showing surgical procedure used in our study

SL No	Mode of Treatment	No of Patients	Percentage (%);
1.	Decompression with Instrumentation (GROUP-A)	9	52.94
2.	**Decompression without Instrumentation (GROUP-B)**	**8**	**47.06**

Table 6:Outcome of 17 surgically managed patients as assessed by pre treatment and post-treatment (joa) score

Duration of follow up		Outcome				
		Poor	**Fair**	**Good**	**Excellent**	**Total**
3 months	Decompression with instrumentation		3(37.50%)	5(62.50%)		8
	Decompression without instrumentation		7(87.50%)	1(12.50%)		8
6 month	Decompression with instrumentation			6(85.71%)	1(14.29%)	7
	Decompression without instrumentation			7(87.50%)	1(12.50%)	8
> 6months	Decompression with instrumentation			4(57.14%)	3 (42.86%)	7
	Decompression without instrumentation			**5(71.43%)**	**2(28.57%)**	**7**

Discussion

In our study, maximum number of patients (35.29%) were in age group 50— 59 years followed by 30 - 39 years, average age of patients in our study was 46.59 yrs. with similar age and sex distribution reported by others.In our study there is gross improvement in JOA score for low back pain of preoperative patients. At 3 month follow-up, J)- value (< 0.05) is significant for group- A Vs. group-B but there is no statistically significant difference between the postoperatives, JOA score for low back pain of Group A Vs. Group B at final follow- up. 77.77% of patients undergoing decompression with instrumentation get complete relief' from low back pain.

Bridwell et al. reported that early post-operative relief of back pain often is attributed to the immediate stabilization provided by the instrumentation. In a prospective study of 44 patients, Bridwell et aL5 found no significant difference between the results of decompression alone and decompression and fusion.

In group A (patients who underwent decompression with instrumentation) 88.88% of patients ha(l sensory deficit, out of which 87.5% have complete recovery and all patients had motor deficit out of' which 44.44% of patients get complete recovery from motor deficit. In group B (patients who underwent decompression without instrumentation) all patients had sensory deficit, out of which 75% have complete recovery and all patients had motor deficit, out of which 75% have complete recovery.

Weir B et al[6] reported that the incidence of permanent nerve root injury has been reported to be 60% less common in patients in whom decompression is not combined with fusion.

In our study at final follow up, those patients who were managed with decompression with instrumentation had 33.33% (n=3) Excellent outcome, 55.55% (n=5) Good outcome and 11.11% (n 1) Fair outcome and those patients who were managed with decompression without instrumentation had 12.50% (n=1) Excellent outcome, 75% (n6) Good outcome, 12.50% (n=1) fair outcome. No patient had poor outcome, Outcome of study was also affected clue to some variables like running, lifting or holding heavy weight scores less in our study clue to aged population and female patients. These variables also scores less even in normal female and person aged around 50 years There is gross improvement in JOA score at final follow-up of pre-operative patients but there is no statistically significant difference between the post-operative JOA score at final follow-up of Group A Vs. Group B.

The results of prospectively evaluated ODI and SF-36 PCS-based outcomes indicated that surgery for symptomatic lumbar spinal stenosis and Grade I spondylolisthesis dramatically improved 1 -year outcomes regardless of the applied surgical strategy.

Source of Support: Nil
Conflict of Interest: None

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